

You must show ALL work.

Solve each equation for the indicated variable.

1. $\frac{9-(-1)}{5x} = \frac{5}{x+6}$

$$\frac{10}{5x} = \frac{5}{x+6}$$

$$10(x+6) = 5(5x)$$

$$\begin{array}{r} 10x + 60 = 25x \\ -10x \quad -10x \end{array}$$

$$\begin{array}{r} 60 = 15x \\ \hline 15 \quad 15 \end{array}$$

$$\boxed{4 = x}$$

4. $(6) \frac{x-9}{6} = 2(6)$

$$\begin{array}{r} x-9 = 12 \\ +9 \quad +9 \end{array}$$

$$\boxed{x = 21}$$

2. $\frac{3}{2} \cdot \frac{2}{3} x = -8 \cdot \frac{3}{2}$

$$\boxed{x = -12}$$

3. $4x+3=19$

$$\begin{array}{r} -3 \quad -3 \\ \hline 4x = 16 \end{array}$$

$$\begin{array}{r} 4x = 16 \\ \hline 4 \quad 4 \end{array}$$

$$\boxed{x = 4}$$

5. $\frac{1}{2}x - \frac{2}{3} = \frac{1}{6}$

$$\begin{array}{r} +\frac{2}{3} \quad +\frac{2}{3} \\ \hline \end{array}$$

$$\frac{2}{1} \cdot \frac{1}{2} x = \frac{5}{6} \cdot \frac{2}{1}$$

$$\boxed{x = \frac{5}{3}}$$

6. $9x-4(x+1)=31$

$$9x-4x-4=31$$

$$5x-4=31$$

$$\begin{array}{r} +4 \quad +4 \\ \hline 5x = 35 \end{array}$$

$$\begin{array}{r} 5x = 35 \\ \hline 5 \quad 5 \end{array}$$

$$\boxed{x = 7}$$

7. $3x-(8+3x)=8$

$$3x-8-3x=8$$

$$-8=8$$

no solution

8. $6(2x-3)=5(2-x)-13$

$$12x-18=10-5x-13$$

$$12x-18=-5x-3$$

$$\begin{array}{r} +5x \quad +5x \\ \hline 17x-18=-3 \end{array}$$

$$\begin{array}{r} 17x-18=-3 \\ +18 \quad +18 \\ \hline 17x = 15 \end{array}$$

$$\begin{array}{r} 17x = 15 \\ \hline 17 \quad 17 \end{array}$$

$$\boxed{x = \frac{15}{17}}$$

9. $3x-(7x+12)=2(x-3)$

$$3x-7x-12=2x-6$$

$$-4x-12=2x-6$$

$$\begin{array}{r} +4x \quad +4x \\ \hline -12=6x-6 \end{array}$$

$$\begin{array}{r} -12=6x-6 \\ +6 \quad +6 \\ \hline -6=6x \end{array}$$

$$\begin{array}{r} -6=6x \\ \hline -6 \quad 6 \end{array}$$

$$\frac{-6}{6} = \frac{6x}{6}$$

$$\boxed{-1 = x}$$

10. $6(11-2x)-(5x+17)=9(10-2x)+23$

$$66-12x-5x-17=90-18x+23$$

$$-17x+49=-18x+113$$

$$\begin{array}{r} +18x \quad +18x \\ \hline x+49=113 \end{array}$$

$$\begin{array}{r} x+49=113 \\ -49 \quad -49 \\ \hline x = 64 \end{array}$$

$$\boxed{x = 64}$$

Solve for the indicated variable.

11. $A = \frac{1}{2}bh$ for h

$$(2) A = \frac{1}{2}bh$$

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\boxed{\frac{2A}{b} = h}$$

13. $ax - c = b$ for x

$$\begin{array}{r} +c +c \\ ax - c = b \\ \hline ax = b + c \\ \frac{ax}{a} = \frac{b+c}{a} \\ x = \frac{b+c}{a} \end{array}$$

12. $P = 2l + 2w$ for w

$$\begin{array}{r} -2l -2l \\ P - 2l = 2w \\ \hline \frac{P-2l}{2} = \frac{2w}{2} \\ \boxed{\frac{P-2l}{2} = w} \end{array}$$

14. $\frac{3b-4}{2} = c$ for b

$$\begin{array}{r} 3b - 4 = 2c \\ +4 +4 \\ \hline 3b = 2c + 4 \\ \frac{3b}{3} = \frac{2c+4}{3} \\ \boxed{b = \frac{2c+4}{3}} \end{array}$$

Write an equation and solve.

15. Translate the verbal sentence into an equation and then solve.

Twice a number increased by 5 is the same as the number decreased by seventeen.

Equation: $2x + 5 = x - 17$

Write an equation and then solve.

16. Stephen is buying a pair of water skis that are on sale for $\frac{2}{3}$ of the original price. After he uses a \$25 gift certificate, the cost before taxes is \$115. What is the original price of the skis?

What are you looking for? The original price of the skis.

Equation: $\frac{2}{3}x - 25 = 115$

$$\begin{array}{r} \frac{2}{3}x - 25 = 115 \\ +25 +25 \\ \hline \frac{2}{3}x = 140 \end{array}$$

$$\begin{array}{r} \cancel{3} \cdot \frac{2}{\cancel{3}}x = 140 \cdot \frac{3}{2} \\ x = 210 \end{array}$$

The original price of the skis was \$210.

17. Find three consecutive odd integers whose sum is 117. Find the integers.

Equation: $x + (x+2) + (x+4) = 117$

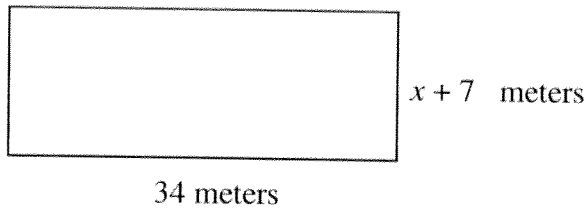
$$x + (x+2) + (x+4) = 117$$

$$\begin{array}{r} 3x + 6 = 117 \\ -6 -6 \\ \hline 3x = 111 \end{array}$$

$$\begin{array}{r} \frac{3x}{3} = \frac{111}{3} \\ x = 37 \end{array}$$

$$\underline{37, 39, 41}$$

18. If the area of the rectangle pictured below is 408 m^2 . Find the width of the rectangle.



$$34(x+7) = 408$$

Equation: _____

$$\begin{array}{r} 34x + 238 = 408 \\ - 238 \quad - 238 \\ \hline 34x = 170 \end{array}$$

$$x = 5$$

$$\begin{array}{l} \text{width} = \\ 5 + 7 \\ \hline 12 \text{ meters} \end{array}$$

19. A container company wants to make a cylindrical can with a volume of 1188 cubic inches. The formula $V = \pi r^2 h$ is used to calculate the volume of a cylinder, where V represents the volume, r represents the radius of the cylinder's base, and h represents the height of the cylinder.

- a) Solve the formula for h .

$$\frac{V}{\pi r^2} = \frac{\pi r^2 h}{\pi r^2} \quad \frac{V}{\pi r^2} = h$$

$$\underline{h = \frac{V}{\pi r^2}}$$

- b) What height should the company make the can if the radius of the base must be 6 inches? Use $\pi \approx 3.14$ Round to nearest hundredth.

$$\underline{h = \frac{1188}{3.14(6^2)} \approx 10.51}$$

20. (Multiple Choice): If $\frac{x}{6} - 2 = 4$, the value of $\frac{x}{4}$ is _____.

$$\begin{array}{l} \frac{x}{6} - 2 = 4 \\ \frac{x}{6} + 2 = 4 + 2 \\ \frac{x}{6} = 6 \\ x = 36 \end{array} \quad \text{so} \quad \frac{36}{4} = 9$$

a. 1

b. 9

c. 12

d. 36

21. (Multiple Choice): Complete the equation by inserting an expression that makes the equation true.

$$(x+4) - 2x - (x+3) + \underline{\hspace{2cm}} = 5x - 3$$

$$\begin{array}{l} x + 4 - 2x - x - 3 \\ -2x + 1 + \underline{7x - 4} = 5x - 3 \end{array}$$

a. $7x - 10$

b. $7x - 4$

c. $x - 4$

d. $-3x - 10$